Measuring the effects of central softening of drinking water in households and industries in Brøndby

Godskesen, Berit; von Bülow, Dorthe; Rygaard, Martin

Publication date:
2018

Document Version
Publisher's PDF, also known as Version of record

DTU Environment
Department of Environmental Engineering

Measuring the effects of central softening of drinking water in households and industries in Brøndby, Denmark

B. Godskesen[a], Dorthe von Bülow[b], ***M. Rygaard[a]***

[a]Technical University of Denmark, Dept. of environmental engineering, *e-mail:mryg@env.dtu.dk*

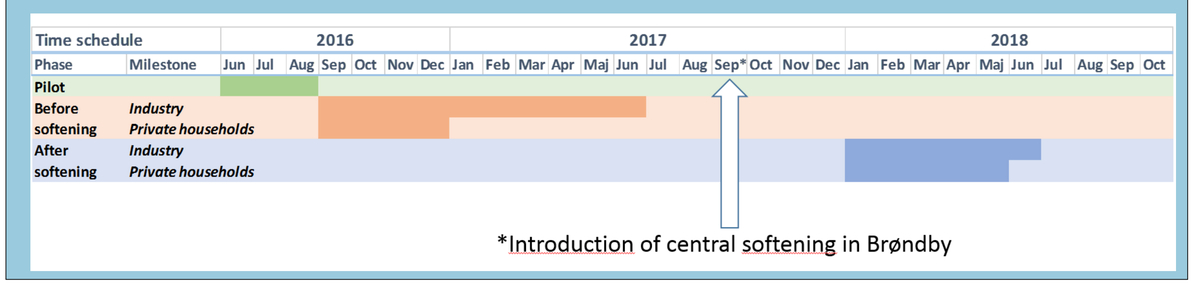
[b]HOFOR, Greater Copenhagen Utility

Introduction

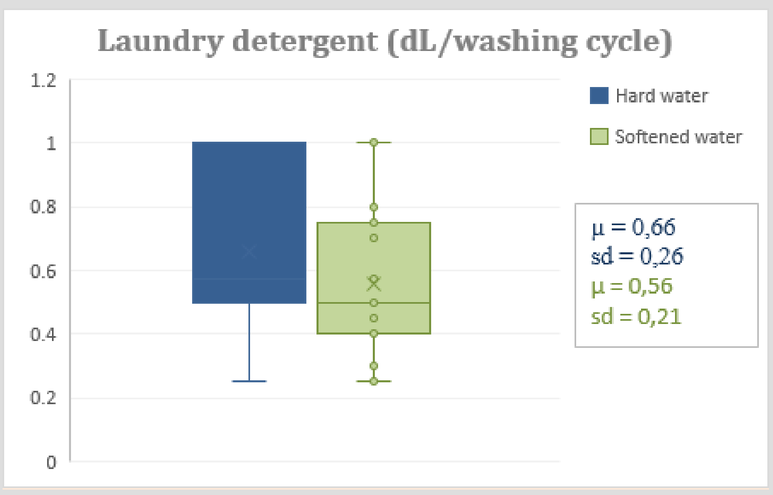
- Drinking water hardness affects the economy, environment and convenience experienced by the water user
- We want to provide actual measurements of the effects before and after introducing central softening in Brøndby, Copenhagen
- In Denmark economic cost-benefit analysis (CBA) [1,2] and environmental life-cycle assessment (LCA)[3] show significant benefits from introducing central softening at waterworks where water hardness levels are above 250 mg/L as $CaCO_3$
- Most CBA and LCA conclusions are based on theoretical assumptions

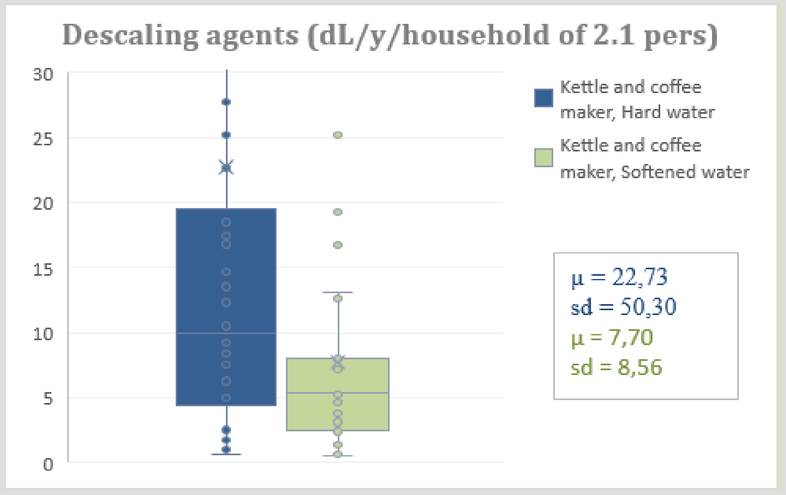
Methods and participants in the project

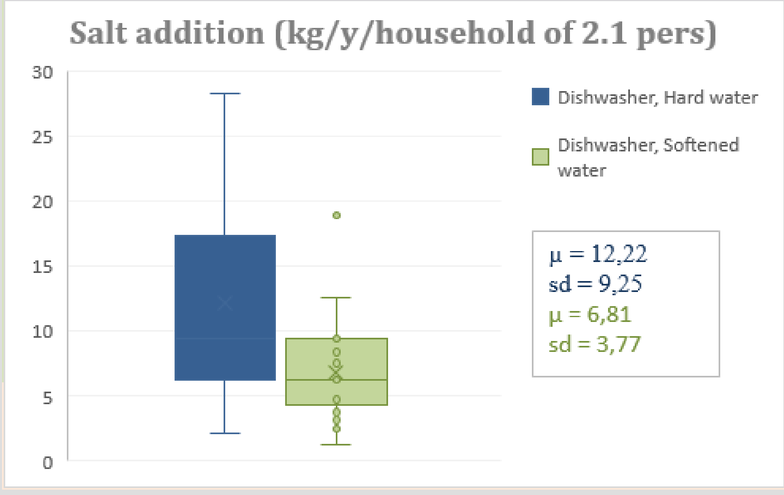
- Measurements are carried out *before* (371 mg/L) and *after* (205 mg/L) introducing central softening. A comparison of the two set of measurements shows the effects of water softening
- Participants and measurements:
  - 30 private households: Consumption of descaling agents, dishwasher salt, laundry detergents, fabric softener, time for removing scaling
  - 4 Industries: Water heating efficiency, salt consumption (ion exchanger), precipitation in tap aerators and toilet cisterns



Preliminary results – Private households

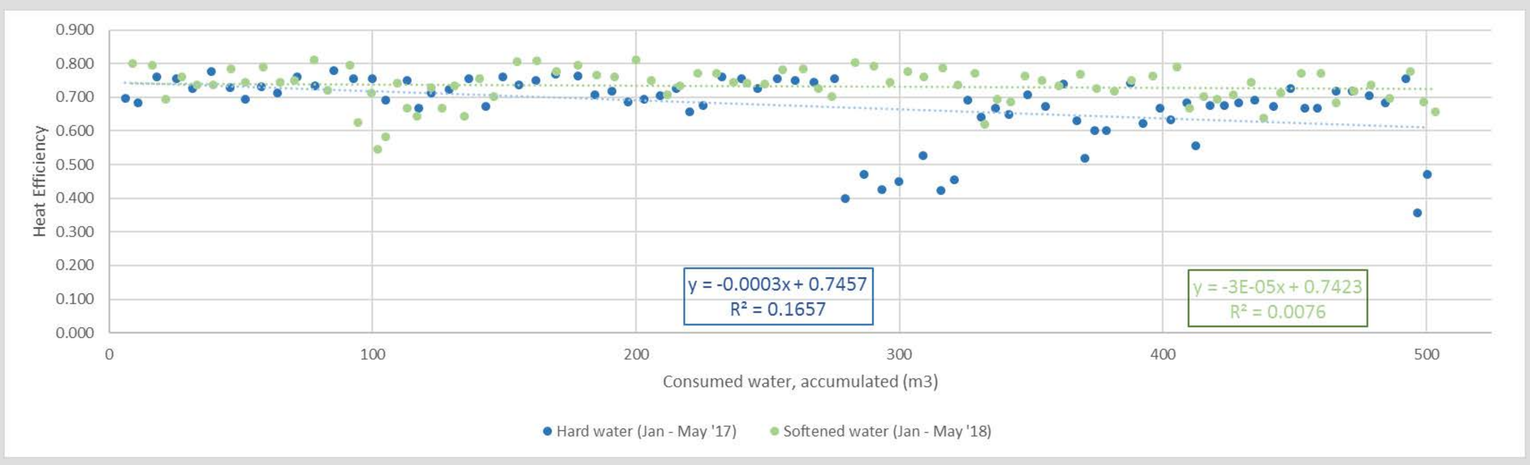




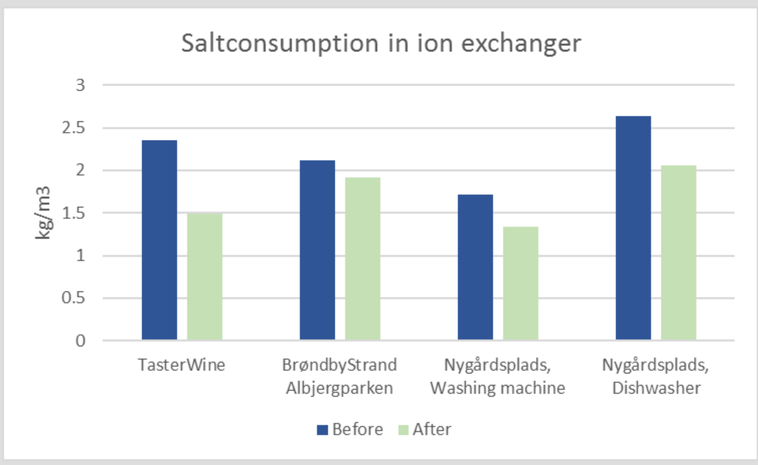


Consumption of: laundry detergent; descaling agents for kettle and coffee maker; and salt addition in dishwasher is reduced with softened water

Preliminary results - Industries



Efficiency of one central heating installation before and after softening
Heat efficiency decreases 0.8% with softened water compared to 8% with very hard water during a 4 month period between services.



Consumption of salt for decentralised water softening devices is decreased

[1]COWI (2011). Central blødgøring af drikkevand.
[2]Rambøll (2017). Blødt vand i en cirkulær økonomi.
[3]Godskesen et al. (2012). Life cycle assessment of central softening of very hard drinking water. *J.env.man*.(105) 83-89